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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : B65D 79/00 — A1

(11) International Publication Number: WO 96/38351

(43) International Publication Date: 5 December 1996 (05.12.96)

(21) International Application Number: PCT/GB96/01298

(22) International Filing Date: 31 May 1996 (31.05.96)

(30) Priority Data:

9511036.7	1 June 1995 (01.06.95)	GB
9514602.3	17 July 1995 (17.07.95)	GB

(81) Designated States: AU, CA, CN, JP, MX, NZ, SG, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

Published
With international search report.
Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

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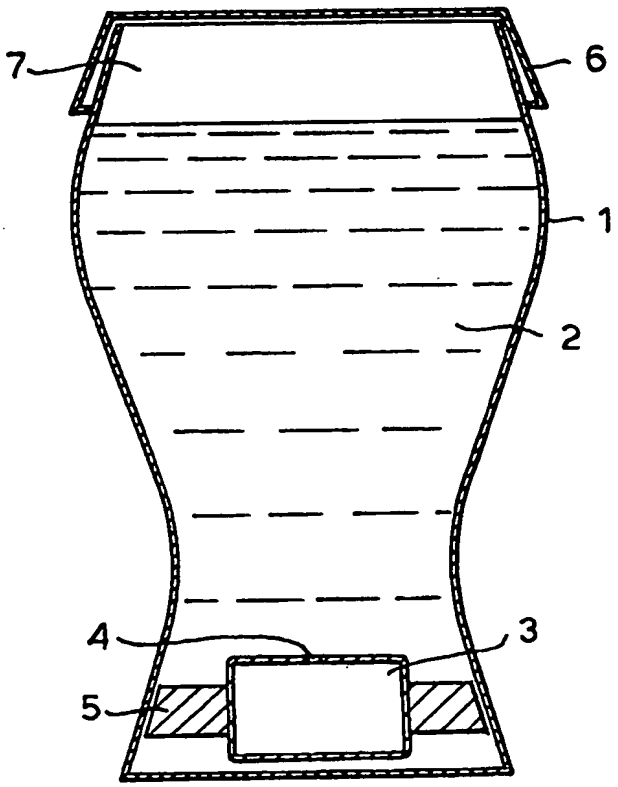
(54) Title: BEVERAGE CONTAINER

(57) Abstract

A container (1) for a carbonated beverage (2) having a wide open mouth (7) allowing the carbonated beverage (2) to be consumed easily and directly from the container (1). The container (1) also includes a secondary chamber (3) containing fluid at a high pressure, and a means (4) to allow communication between the inside of the secondary chamber (3) and the carbonated beverage (2) upon opening of the container (1). This arrangement causes the liberation of gas from the beverage (2) giving an appearance similar to that of a beverage dispensed from draught.



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BEVERAGE CONTAINER

TECHNICAL FIELD

Conventionally, beer and other carbonated beverages are either dispensed from draught, or are supplied in individual containers, for example glass bottles or metal cans, each containing a single measure of the beverage. When the beverage is to be consumed, it is usually transferred, either from draught or from the individual containers, into a large mouthed drinking vessel, for example a glass. It is sometimes the case that the beverage is consumed directly from its individual container, however it is much easier to drink the beverage from a large mouthed drinking vessel rather than through the small dispensing aperture of a conventional bottle or can.

When it is required to supply beverages to a large number of people over a short time period, for example at sporting events and concerts, it is necessary to serve individual measured portions very quickly. When dispensing beverage from draught into glasses, the rate at which customers can be served is too low. Further, glasses can cause a potential danger in large crowds if they become broken. The rate at which customers can be served is increased by providing beverages in individual containers, however again glass bottles and metal cans are potentially dangerous if they are broken or thrown. At present, therefore, many sports arenas insist on the beverage, either from draught or from individual containers, being transferred to a separate plastics drinking vessel. This is particularly time consuming.

BACKGROUND ART

One solution to this problem is proposed in WO-A-92/17376 in which the beverage is supplied in a large mouthed plastics open topped container with a seal over the mouth of the container. To supply the beverage to a consumer, the seal is removed to reveal the majority of the mouth. In this way, the beverage is not dispensed

into another container before supply to the consumer, and therefore the beverage can be supplied much more quickly. In the examples of containers disclosed in WO-A-92/17376, the seal is either a lid which is heat sealed over the mouth of the container, in which case the lid includes a circumferential tear strip to allow its removal, or alternatively the seal is a screw cap having an internal thread which co-operates with an external thread of the container.

Recently, a number of systems have been proposed and commercialised in which a beverage is dispensed from a container such as a can to give the appearance of a beverage dispensed from draught. Many of these proposed systems require the inclusion of a secondary chamber in the container, the secondary chamber including liquid or gas held at the same high pressure as the beverage in the container. Upon opening the container, the liquid or gas from the secondary chamber jets into the beverage in the main body of the container. The jetted fluid creates shear in the beverage and this causes the liberation of gas from the beverage. As the beverage is dispensed from the container, small gas bubbles liberated from the beverage seed the generation of further gas bubbles, which separate out to form a close-knit creamy head.

One such system is disclosed in our earlier application WO-A-91/07326. This discloses a separate closed insert containing a pressurised gas provided in the beverage container. The insert includes a means responsive to the opening of the container to allow communication between the inside of the insert and the beverage in the container through which gas from the insert jets into the beverage causing shear in the beverage and liberation of gas.

SUMMARY OF THE PRESENT INVENTION

According to the present invention, a container for a carbonated beverage, the container having a wide open-mouth closed by a removable end closure, the end closure being

removable to reveal substantially all of the open mouth of the container, and a secondary chamber including a means to allow communication between the inside of the secondary chamber and the beverage in the container upon removal of the end closure to liberate gas from the beverage and create a foamed head on the beverage.

This system is particularly beneficial as it gives a container for a carbonated beverage which, upon opening, gives an appearance as if it has been dispensed from draught without requiring the beverage to be dispensed from the container in which it has been stored, the substantially open wide mouth of the container enabling the beverage to be consumed easily and directly from the storage container. Therefore, the container provides a beverage with an improved appearance on serving, and which reduces the time required to supply the beverage to a consumer.

The secondary chamber may be a separate hollow insert such as that disclosed in our earlier application WO-A-91/07326, in which the insert is pressurised with inert gas, and includes a means to allow communication between the inside of the insert and the primary chamber upon opening of the container. It is preferred that the means for allowing communication is a one-way valve, and more preferably the one-way valve is a duckbill valve. In this case, it is preferred that the insert includes a gas permeable membrane through which gas from the beverage is able to pass to pressurise the insert. The use of a duckbill valve is particularly beneficial as the aperture through which fluid is jetted varies with the pressure across the valve, thereby giving a substantially constant velocity jet.

Alternatively, the secondary chamber may be a separate hollow insert including a small aperture through which fluid contained in the insert is jetted into the beverage upon opening of the container. In this case, it is advantageous for the insert to include a downpipe

extending from the small aperture towards the bottom of the insert, the insert also including a deformable portion around the aperture so that on opening of the container, the deformable portion flexes outwardly lifting the downpipe away from the bottom of the insert. This is advantageous as any beverage entering the insert through the small aperture will initially be retained in the downpipe. Upon opening, the bottom of the down pipe will lift away from any beverage collected in the bottom of the insert, and accordingly substantially only gas will be jetted from the insert.

In the past, fluid has been jetted into the beverage via a single restricted orifice. This jet of fluid liberates gas bubbles from the beverage around the restricted orifice. As the beverage is dispensed from the container, these small bubbles mix with the beverage and seed the generation of further gas bubbles. In the present case, the beverage is not dispensed from the container. It is therefore advantageous to jet the fluid from multiple jet sites, for example through a plurality of small apertures or one-way valves, thereby liberating gas bubbles from the beverage at a plurality of sites. The insert may include a gas permeable membrane through which the gas jets over a large area, thereby liberating gas bubbles from the beverage over the large area.

The insert preferably includes radially extending means which expand to contact the sides of the container to hold the insert in position. These means are preferably fins. It is further preferred that the container includes a waisted portion of reduced diameter. In this way, the insert may be positioned below the waisted portion with radial fins contacting the side, thereby preventing the insert from falling out of the container. This is especially beneficial where the container is a glass or plastics container, since these materials tend to creep when the container is formed, and therefore it is not possible to manufacture the container and control the inner

diameter within the same small tolerances possible for metal cans. Accordingly, it is not possible to make an insert which will always have a tight interference fit with a glass or plastics container.

Especially where the insert includes a gas permeable membrane, it is preferred that the gas used to dose the container after filling is argon, rather than nitrogen as conventionally used. This is advantageous as some plastics are more permeable to argon than to nitrogen. The use of argon therefore reduces the period required to pressurise the insert. As argon is more soluble than nitrogen, the overall internal pressure of the sealed container is reduced when using argon than when using nitrogen. This is beneficial where the container is a glass or plastics container since these are not able to withstand the same high pressures which metal cans can withstand. Further, the seals over the large open mouths of the container have a large surface area, and therefore are unable to withstand as high a pressure as the closures on conventional containers.

Where the container is made of glass, it is preferably formed by first pressing the glass using a die to form a parison, and blowing the parison into the required shape. For a plastics container, the walls are preferably made from a laminate including one layer for providing structural stability of the bottle, such as polyethylene-terephthalate (PET), and an oxygen barrier material, for example nylon, orientated PET or poly-acrylonitrile (PRN). It is important to prevent oxygen from entering the container since oxygen may spoil the beverage. It is particularly preferred to use a laminate of polypropylene, an oxygen barrier and polyethylene-terephthalate.

The end closure may be a two-part seal including a first gas impermeable sheet fixed across the mouth of the container, and a second outer cap able to withstand the high pressure within the sealed container. The inner seal

may be heat sealed or adhered to the rim of the mouth of the container. The outer cap may be attached by a screw thread, a bayonet fitting, or by an interference fit clip. It is preferred that the inner seal is arranged to be removed with the outer cover in a one-stage process, for example by perforating and becoming locked into the outer cover. This avoids the need for two covers being separately removed, and ensures the minimum time to dispense the beverage. Alternatively, a one-piece gas impermeable, pressure resistant cover may be provided. Such a one-piece cover may be a clip-on, crimp-on or rip-off cap.

To avoid explosion of the container, it is advantageous to provide a shrink wrap around the container.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a cross-section of an open topped container according to the present invention;

Figure 2 shows a cross-section of an example of an insert for use in an open topped container;

Figure 3 shows a further cross-section of the insert shown in Figure 2;

Figure 4 shows a cross-section of a second example of an insert for use in an open topped container;

Figure 5 shows a cross-section of a third example of an insert for use in an open topped container;

Figure 6 shows a cross-section of a fourth example of an insert for use in an open topped container;

Figure 7 shows a cross-section of a fifth example of an insert for use in an open topped container;

Figure 8 shows a carbonated beverage container with a still further example of an insert for use in the present invention;

Figure 9 shows a carbonated beverage container having a partition wall;

Figure 10 shows a plan view of an insert for use in an open topped container;

Figure 11 shows a plan view of an end closure of the container; and,

Figure 12 shows a cross-section of an alternative end closure for use in an open topped container.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figure 1 shows a cross section of an open topped container according to the present invention in which the container 1 includes a beverage 2 and an insert 3. The insert 3 includes a means 4 through which fluid is jetted into the beverage 2 upon opening of the container 1, the insert 3 being fixed to the inside of the container 1 by radially extending ribs 5. The container 1 includes a seal top 6 over the mouth 7 of the container 1.

Figures 2 and 3 show a first example of an insert for use in the container 1. The insert 10 includes a small aperture 11 in the insert's top 12. A downpipe 15 is provided around the aperture 11 extending from the insert's top 12 towards the insert's bottom 13. Hinged portions 16 are provided in the top 12 of the insert 10. Where the pressure on the outside of the insert is equal to or greater than the pressure on the inside, the hinged portions ensure the top 12 of the insert 10 is urged towards the bottom 13 of the insert, and in this case the bottom of the downpipe 15 will abut the bottom 13 of the insert.

The insert 10 is charged to a super-atmospheric pressure equal to that in the sealed container. This charging may be achieved by including a gas permeable membrane in a wall of the insert 10. Gas from the carbonated beverage will gradually permeate through the membrane to charge the insert 10. Alternatively, gas may seep into the insert 10 through the downpipe 15. In these examples, to minimise liquid ingress during this charging, the container is inverted. Alternatively, the insert 10 may be pre-charged with inert gas prior to filling and sealing the container. In this case, the hinges 16 may initially withstand a pressure difference between the

inside of the insert 10 and the surrounding atmosphere, but be modified, for example due to the high temperatures during pasteurisation, to flex at a low pressure difference upon opening the container.

When the container 1 is opened, the pressure in the container will rapidly vent to atmospheric. At this time, the pressure inside the insert 10 will be greater than that in the container, and accordingly the top 12 of the insert 10 will be hinged upwards by the hinges 16 as shown in Figure 3, lifting the bottom of the downpipe 15 away from the bottom 13 of the insert. Gas from inside the insert will jet through the aperture 11 into the beverage causing shear in the beverage and the resultant liberation of gas bubbles. As the top 12 of the insert 10 flexes outwards, the bottom of the downpipe 15 lifts clear of the bottom 13 of the insert, and clear of any beverage 14 which may have leaked into the insert. This ensures that substantially no beverage 14 is jetted upon opening the container.

The hinges 16 are designed so that, even when the pressure inside the insert 10 is the same as the pressure inside the container, the top 12 remains hinged upwards with the downpipe 15 lifted above the base of the insert 10. This allows the complete equalisation of pressure between the container and insert 10.

Figure 4 shows an alternative insert 20 which is substantially the same as that shown in Figures 2 and 3 except a plurality of apertures 11 and associated down pipes 15 are provided.

Figure 5 shows yet another example of an insert for use in a container according to the present invention. In this case, the insert 30 includes a depressed top 31 including an aperture 11 so that in its normal state, the aperture 11 is close to the bottom 32 of the insert 30. Upon opening the container, the pressure inside the insert 30 exceeds the pressure in the container, and accordingly the top 31 flexes outwards about the hinged portion 16, lifting the aperture 11 clear of the bottom 32 of the

insert 30 and allowing gas to jet through the aperture 11. Again, the hinges 16 are arranged such that when the top 31 has flexed outwards, the hinges 16 prevent the top 31 returning inwards.

Figure 6 shows a further example of an insert 40 which is similar to that shown in Figure 5. In this case, the aperture is replaced by a one-way duckbill valve 41. The duckbill valve abuts the bottom 44 of the insert 40. This abutment ensures no back leakage of the valve. The top 42 of the insert 40 is arranged to flex about hinged portions 43 to lift the duckbill valve 41 clear of the bottom 44 of the insert 40 upon opening the drinking vessel. As no fluid or gas from the beverage may enter the insert via the one-way valve 41, a portion of the insert 40 includes a gas permeable membrane through which gas from the beverage enters the insert to pressurise the insert.

A similar insert 50 is shown in Figure 7. However, in this case a plurality of duckbill valves 51 are provided. In this case, the bottom of the duckbill valves 51 are spaced apart from the bottom 53 of the insert 50, and therefore there is no requirement for a hinged portion.

The insert 50 includes a gas permeable membrane 52 through which gas from the beverage pressurises the insert.

An alternative insert which may be used in the container of the present invention is shown in Figure 8. This insert 64 shown in Figure 8 includes a gas permeable membrane 65 through which gas may pass easily, but which forms a substantial block to the flow of liquid. Upon opening of the container 1, gas contained within the insert 64 gushes through the gas permeable membrane 65 into the beverage 62 to liberate gas bubbles from the beverage 62. As liquid cannot pass through the membrane 65 into the beverage 62, only gas is jetted. This has been found to give improved shear in the beverage 62. The area over which gas passes into the beverage 62 is much greater than for a conventional restricted orifice, and therefore causes shear at many more sites giving an improved appearance. As

gas passes freely through the gas permeable membrane 65, there will be no risk from residual pressure in the insert 64.

The use of the gas permeable membrane 65 also allows for the charging of the insert 64. The insert 64 is initially provided in the container 1 which is flushed with inert gas or otherwise inerted, in a conventional manner. The container 1 is then filled and sealed with carbonated beverage 62. Gas from the beverage 62 permeates through the membrane 65, but liquid is kept from the inside of the insert 64, thereby charging the insert 64 with inert gas to a pressure substantially equal to that inside the container 1.

The gas permeable membrane 65 may be a hydrophobic membrane, such as microporous PTFE or Tyvek™. The pore size is about 0.2μ, and the membrane has a surface area of 300 to 700m^2.

Instead of a separate insert, the container 1 may be divided by a partition wall 76 including a gas permeable membrane 75, as shown in Figure 9. This operates in a manner similar to the insert 64 with gas permeable membrane 65.

The use of an insert 64 or other secondary chamber 74 including a gas permeable membrane 65,75 through which gas gushes into a beverage 62,72 in a container is not limited to the container of the present invention, but can be used in any carbonated beverage container.

Figure 10 shows a plan view of an insert for use with the present invention. The insert 3 may be any of these described previously in this application. The insert 3 includes a plurality of radially extending fins 5, which in their extended condition have an outer diameter greater than the inner diameter of the container 1 in which the insert is held. In this way, the insert 3 may be pushed into the container 1 and the radial fins 5 extend to retain the insert in the bottom of the container 1.

The container 1 may be manufactured from glass or from plastics material. In either case, the vessel is formed to have a shape generally similar to a conventional beer glass, having a large mouth with a typical diameter of 64 mm. Where the container 1 is formed from glass, the glass is first formed into a parison by pressing it with a die. This parison is subsequently blown to the required shape. Where the container 1 is made from a plastics material, this is formed by blow moulding a plastics laminate which includes one layer for gas impermeability, for example, nylon, and a further layer for stability. In one example, the plastics may be a laminate having a polypropylene layer supporting a nylon layer which in turn supports a poly-ethylene-terephthalate (PET) layer.

The seal 6 over the mouth of the container 1 must be able to withstand the high internal pressures of up to seven atmospheres which are created within the container 1. The closure may be a rip cap which is an aluminium cap crimped to the top of the container, and which includes weakened portions for allowing the ripping of the cap. Such a cap is shown in plan view in Figure 11. The cap 90 includes a ring pull 91 which is connected the perforations 92 around the edge of the cap. To open the cap, the ring pull is pulled and the cap tears around the perforations 92 allowing the cap 90 to be removed easily from the mouth of the container.

Alternatively, the seal may be in a two part form as shown in Figure 12. In this case, a first seal 95 is heat sealed or adhered to the mouth of the container 1. The seal 95 is a gas impermeable seal. A secondary cap 96 is provided over the seal 95, the secondary cap 96 including projections 97 which clip into recesses 98 in the outside of the vessel 1 to snap the cap 96 in place. The cap 96 is able to withstand the high pressures generated within the beverage container. In this case, it is preferred that on removal of the second cap 96 substantially all of the first cap 95 is removed at the same time. This may be

achieved by including a weakened portion around the edge of the seal 95 so that this seal ruptures on removal of the cap 96.

CLAIMS

1. A container (1) for a carbonated beverage (12), the container having a wide open mouth (7) closed by a removable end closure (6), the end closure (6) being removable to reveal substantially all of the open mouth (7) of the container (1), and a secondary chamber (3,10,20,30, 40,50,64,74) including a means (4,11,41,51,65,75) to allow communication between the inside of the secondary chamber (3,10,20,30,40,50,64,74) and the beverage (2) in the container (1) upon removal of the end closure (6) to liberate gas from the beverage (2) and create a foamed head on the beverage (2).

2. A container (1) according to claim 1, in which the secondary chamber (3,10,20,30,40,50,64) comprises a separate hollow insert (3,10,20,30,40,50,64) pressurised with inert gas, and including a means (4,11,41,51,65) to allow communication between the inside of the insert (3,10,20,30,40,50,64) and the primary chamber upon opening of the container (1).

3. A container according to claim 1 or 2, further including a downpipe (15) extending from the communication means (11) towards the bottom of the insert (3,10,20), the insert (4,10,20) also including a deformable portion (16) around the communication means (11) so that on opening of the container (1), the deformable portion (16) flexes outwardly lifting the downpipe (15) away from the bottom of the insert (3,10,20).

4. A container (1) according to any one of the preceding claims, in which the communication means (4,11,41,51,65,75) includes a plurality of jet sites through which fluid jets from the secondary chamber (3,10,20,30,40,50,64,74) into the beverage (12) in the container (1) upon opening of the container (1).

5. A container (1) according to any one of the preceding claims, in which the secondary chamber (3,10,20,30, 40,50,64) is a separate hollow insert, and includes radially extending means (5) which expand to contact the sides of the container (1) to hold the insert (3,10,20,30,40,50,64) in position.

6. A container (1) according to claim 5, in which the radially extending means (5) are fins.

7. A container (1) according to any one of the preceding claims, in which the container (1) includes a waisted portion of reduced diameter.

8. A container (1) according to any one of the preceding claims, in which the container (1) is dosed with argon after being filled and prior to sealing.

9. A container (1) according to any one of the preceding claims, in which the walls are made from a laminate including a first layer for providing structural stability of the container (1), such as polyethylene-terephthalate (PET), and a second layer of an oxygen barrier material, for example nylon, orientated PET or poly-acrylonitrile (PRN).

10. A container according to any one of the preceding claims, in which the end closure (6) is a two-part seal including a first gas impermeable sheet fixed across the mouth (7) of the container (1), and a second outer cap able to withstand the high pressure within the sealed container (11).

11. A container (1) according to claim 10, in which the inner seal is heat sealed or adhered to the rim of the mouth (7) of the container (1).

12. A container (1) according to claim 10 or 11, in which the outer cap is attached by a screw thread, a bayonet fitting, or by an interference fit clip.

13. A container (1) according to any one of claims 10 to 12, in which removal of the outer cover is arranged to cause the removal of the inner seal in a one-stage process.

14. A container (1) according to any one of claims 1 to 10, in which the end closure (6) is a one-piece gas impermeable, pressure resistant cover.

15. A container (1) according to any one of the preceding claims, further comprising a shrink wrap around the container.

16. A method of manufacturing a glass container according to any one of the preceding claims, comprising the steps of pressing the glass using a die to form a parison and subsequently blowing the parison into the required shape.

Fig.1.

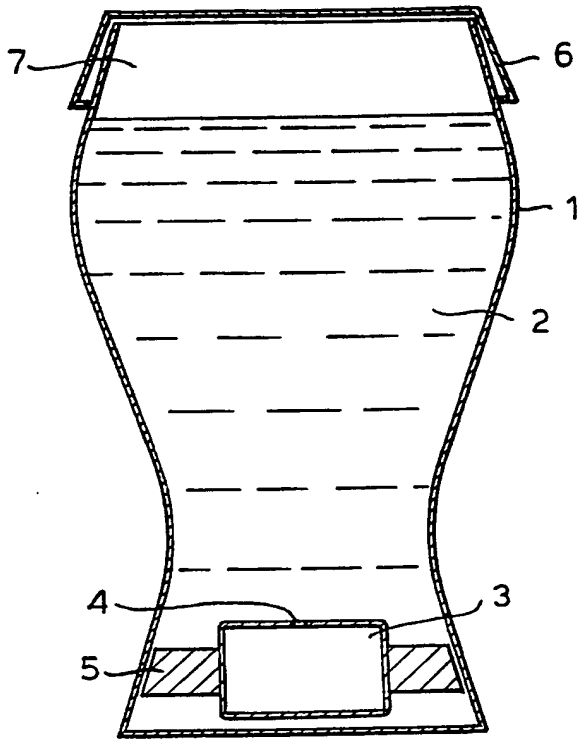


Fig.2.

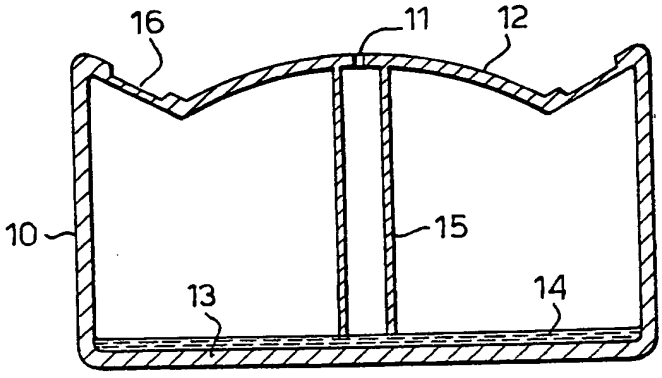


Fig.3.

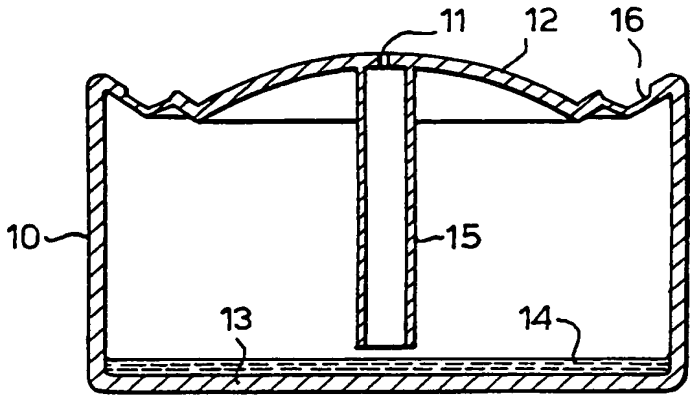


Fig.4.

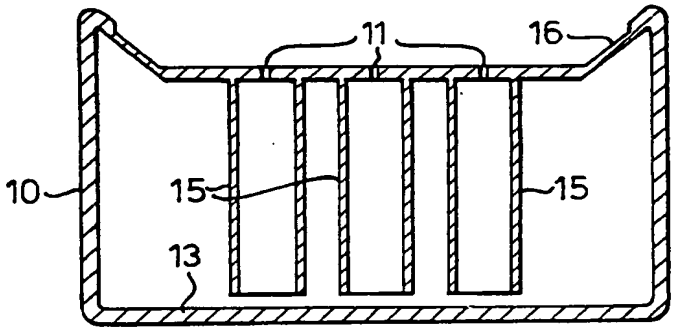


Fig.5.

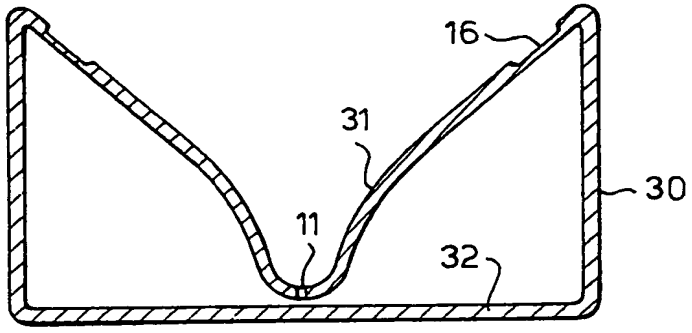


Fig.6.

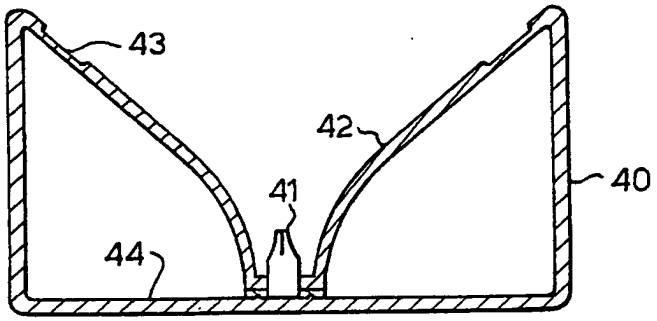


Fig.7.

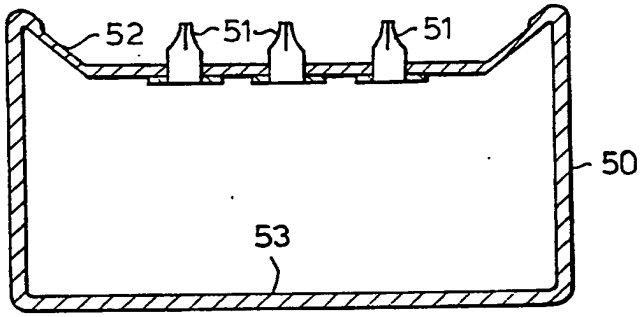


Fig.8.

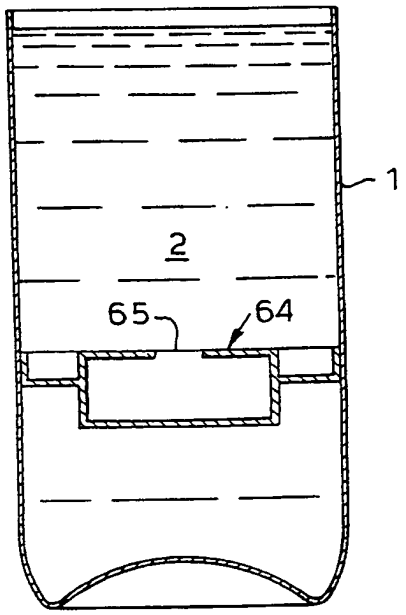


Fig.9.

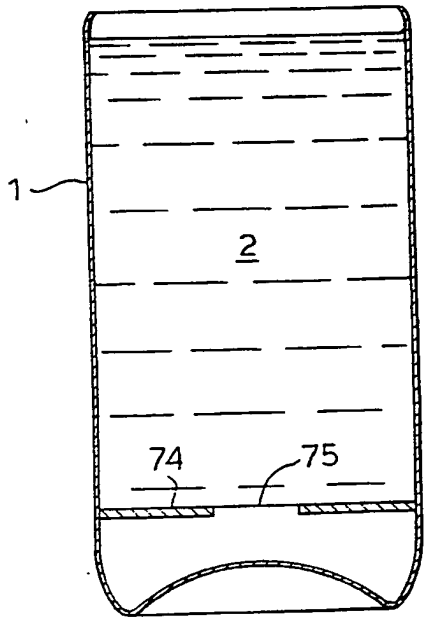


Fig.10.

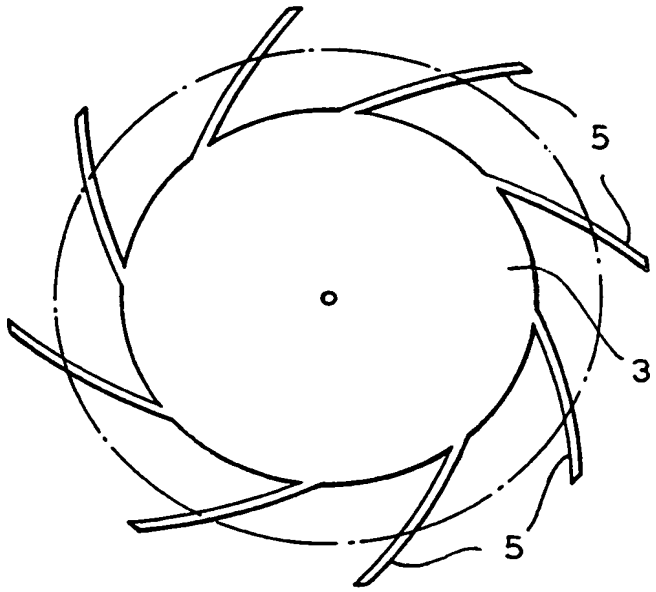


Fig.11.

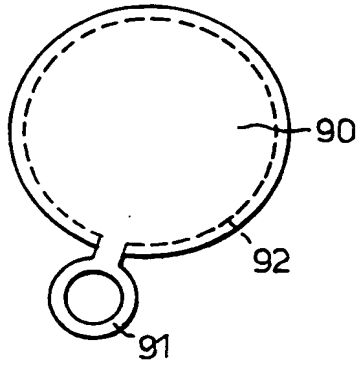
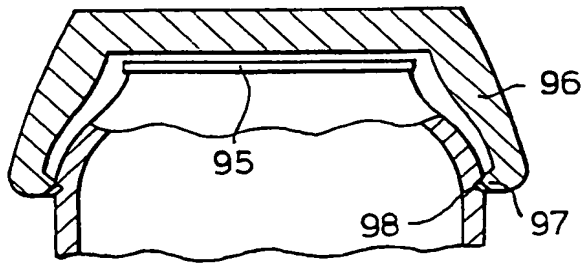


Fig.12.



INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/GB 96/01298

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 B65D79/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	PATENT ABSTRACTS OF JAPAN vol. 9, no. 130 (C-284), 5 June 1985 & JP,A,60 016823 (HOOYA KK), 28 January 1985, see abstract ---	16
Y	WO,A,92 17376 (PARKES) 15 October 1992 cited in the application see page 7, line 17 - page 8, line 19 see abstract; figures 5,6 ---	1-7,9, 14,15
Y	WO,A,92 00896 (E J PRICE) 23 January 1992 see page 6, line 22 - page 7, line 9 see claims 1-4,6,7; figures 5,6 ---	1-3,9, 14,15
Y	GB,A,2 211 813 (E J PRICE) 12 July 1989 see abstract; figure 1 --- -/--	1,4

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
1 October 1996	09.10.96

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl, Fax (+ 31-70) 340-3016	Leitner, J

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INTERNATIONAL SEARCH REPORT

Inter nal Application No
PCT/GB 96/01298

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO,A,91 07326 (WHITBREAD) 30 May 1991 cited in the application see page 15, line 1 - line 23 see abstract; figures 1,4	1,5-7
A	EP,A,0 577 284 (GUINESS BREWING WW) 5 January 1994 see column 7, line 49 - line 58 see abstract; figures 1,2	1
A	US,A,4 856 708 (J. GIASI) 15 August 1989	
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INTERNATIONAL SEARCH REPORT

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Inte: ›nal Application No
PCT/GB 96/01298

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